Patent claims

- method for visual support in the case of electrophysiology catheter application in the heart, whereby electroanatomical 3D mapping data, provided during performance of the catheter application, of an area of the heart to be treated are visualized, characterized in that 3D image data of a body region containing the area to be treated are recorded with a method of tomographical 3D imaging before the catheter application is carried out; the area to treated, or significant portions of it, is extracted from the 3D image data in order to obtain selected 3D image data; and the electroanatomical 3D mapping data and the selected 3D image data are correlated and visualized next to one another in the correct position and dimension.
- The method as claimed in claim 1, characterized in that 2. the 3D image data of the body region are recorded with a method X-ray computer tomography or of magnetic of tomography.
- The method as claimed in claim 1, characterized in that 3. the 3D image data of the body region are recorded by means of a 3D ultrasonic method.
- The method as claimed in one of claims 1 to 3, 4. characterized

in that significant portions of the area to be treated are extracted by segmenting the 3D image data in order to obtain a 3D surface profile of objects in the area which is to be treated.

5. The method as claimed in claim 4, characterized

in that the correlation in the correct position and dimension is made automatically using surface matching by at approximately matching the 3D surface profile from the 3D image data to a 3D surface profile from the 3D mapping data.

- The method as claimed in claim 4, characterized in that the correlation with the correct position and dimension is effected automatically in a first stage during the performance of the catheter application by means of distinct anatomical points or artificial markers and is refined by the surface matching in a later second stage, in which the 3D surface profile from the 3D image data is at least approximately matched to a 3D surface profile from the 3D mapping data.
- 7. The method as claimed in one of claims 1 to 4, characterized

in that the correlation in the correct position and dimension is made manually using a graphical user interface.

The method as claimed in one of claims 1 to 4, 8. characterized

in that the correlation in the correct position and dimension is made automatically using artificial markers which are attached to the patient's thorax before the 3D image data are recorded, and can be identified both in the 3D image data and in the 3D mapping data.

The method as claimed in one of claims 1 to 4, 9. characterized

in that the correlation in the correct position and dimension is made automatically using distinctive anatomical points which can be identified

both in the 3D image data and in the 3D mapping data.

- 10. The method as claimed in one of claims 1 to 9, characterized in that the selected 3D image data are visualized via a volume rendering technique.
- 11. The method as claimed in claim 10, characterized

in that the selected 3D image data are visualized using an adjustable volume rendering transfer function.

- 12. The method as claimed in one of claims 1 to 9 in combination with claim 4, characterized in that the selected 3D image data are visualized as polygonal grid.
- 13. The method as claimed in one of claims 1 to 12, characterized

in that the two visualizations are linked to one another such that when a user rotates, moves or scales one of the visualizations the other visualization is simultaneously subjected to the same rotation, movement or scaling.

14. The method as claimed in one of claims 1 to 13, characterized

in that registration between the 3D image data and the 3D mapping data prompts a representation, contained in the 3D mapping data, of at least some of the catheter to be shown in the visualization of the selected 3D image data in real time.

15. A device for carrying out the method as claimed in one of the preceding claims, comprising

- one or more input interfaces (14, 15) for electroanatomical 3D mapping data and 3D image data,
- an extraction module (11) which is designed to extract an area to be treated, or significant portions of it, from the 3D image data and provides selected 3D image data,
- a registration module (12), connection to the extraction module (11), which is design for correlation of the electroanotomical 3D mapping data and the selected 3D image data in the correct position and dimension, and
- a visualization module (13), connected to the registration module (12), which provides the 3D mapping data and the selected 3D image data for visualization such that that they can be shown in the correct position and dimension next to one another using one or more display units (6).

16. The device as claimed in claim 15, characterized

in that the registration module (12) has a graphical user interface (9) which a user can use to make the correlation in the correct position and dimension manually.

17. The device as claimed in claim 15, characterized

in that the registration module (12) is designed for the automatic correlation in the correct position and dimension using artificial markers which can be identified both in the 3D image data and in the 3D mapping data.

18. The device as claimed in claim 15, characterized

in that the registration module (12) is designed for the automatic correlation in the correct position and dimension using distinctive anatomical points which can be identified both in the 3D image data and in the 3D mapping data.

19. The device as claimed in claim 15, characterized

in that the extraction module (11) is designed to extract the significant portions of the area to be treated by segmenting the 3D image data in order to obtain a 3D surface profile of objects in the area which is to be treated.

20. The device as claimed in claim 19, characterized

in that the registration module (12) is designed for the automatic correlation in the correct position and dimension by surface matching the 3D surface profile from the 3D image data to a 3D surface profile from the 3D mapping data.

- 21. The device as claimed in claim 19, characterized in that the registration module (12) is designed for automatic correlation in the correct position with the correct dimension in a multi-stage process, wherein the correlation in the correct position and the correct dimension is effected by means of distinct anatomatical points or artificial markers in a first stage and is refined by surface matching of the 3D surfaced profile from the 3D image data to a 3D surface profile from the 3D mapping data in a later, second stage.
- 22. The device as claimed in one of claims 15 to 21, characterized in that the visualization module (13) is designed for visualizing a part of a catheter used within the representation of the selected 3D image data in real time.
- 23. The device as claimed in one of claims 15 to 22, characterized

in that the visualization module (13) is designed so that when a user rotates, moves or scales one of

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the visualizations the other visualization is simultaneously subjected to the same rotation, movement or scaling.